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10/840,240

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Jin-Ook Kim

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EXAMINER

YI, STELLA KIM

ART UNIT

PAPER NUMBER

1791

MAIL DATE

DELIVERY MODE

09/30/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/840,240	<b>Applicant(s)</b> KIM, JIN-OOK	
	<b>Examiner</b> Stella Yi	<b>Art Unit</b> 1791	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 September 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

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## **DETAILED ACTION**

### ***Specification***

1. The amendment filed September 16, 2010 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: Paragraph [0035] - "Also, the unit of the filling time (t) is second (sec), the unit of viscosity ( $\eta$ ) of the color resin is poise (P – g/cm\*sec), the unit of the length (z) of the first channel is cm, the unit of the hydraulic radius (R) of the color resin is cm, the unit of interface free energy ( $\gamma$ ) between the color resin and air is erg/cm<sup>2</sup> (= {g\*(cm/sec<sup>2</sup>)\*(cm)}/cm<sup>2</sup>, = g/sec<sup>2</sup>), and the unit of the contact angle ( $\theta$ ) between the resin and the mold is degree (°)." This new subject matter was not described in the specification as filed.

Applicant is required to cancel the new matter in the reply to this Office Action.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims do not define the units of time, viscosity, length, radius, interface free energy, and contact angle.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over NISHIKAWA et al. (6,063,527) and in view of XIA et al. ("Soft Lithography." Angew. Chem. Int. Ed., 1998, pp.550-575) and in further view of SONG et al. (2001/0019382).

Regarding claims 1-20, NISHIKAWA et al. discloses a method for making a color filter for a liquid crystal display device, comprising the steps of: Col.7, line 63 through Col.10, line 3:

(1) providing a removable mold 13 having an intaglio surface with a plurality of groove units formed therein, the groove units being arranged in predetermined pattern (Fig.1B);

(2) attaching the removable mold to a transparent substrate, thereby the intaglio surface and the transparent substrate 10 cooperatively forming a plurality of channel units (Fig.1C) (i.e. groove and substrate constitute a channel);

(3) injecting the said channel units with a photopolymer solution containing colorants (Col.11, lines 15-29);

(4) the said groove units are separated by partition walls, and the groove units comprises three types of grooves which are injected with corresponding red-colored, green-colored, and blue-colored photopolymer sub-pixel solution, respectively (Col.11, lines 23-51);

(5) applying an ultraviolet light to the said photopolymer solution through the transparent substrate 10 so as to cure the photopolymer to the transparent substrate (Col.9, lines 52-63; Fig.1C); and

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(6) removing the removable mold with the patterned photopolymer layer formed on the transparent substrate (Fig.1D).

Steps (1) and (6) corresponds to instant claims 1, 11, and 16 where a removable mold with grooves is being used. Steps (2)-(4) corresponds with instant claims 2, 11, and 16 where channels of the mold are filled with color resin. Step (5) corresponds with instant claims 3, 13, 16, and 19 where curing each of the color resin in the sub-color filters are done by irradiating light which gives off heat. In addition to instant claim 16, it is known to one of ordinary skill in the art that color liquid crystal display devices include an active matrix substrate on which a plurality of active elements are formed, a color filter substrate on which color filter layers of different colors and a common electrode are deposited in this order. Regarding claim 8, the said method further comprises forming a black matrix over the said substrate (Col.5, lines 60-63).

NISHIKAWA et al. does not appear to explicitly disclose using three molds or using the one-mold multiple times, made of polydimethylsiloxane (PDMS) to form the said color filter where the channels are filled with color resin by capillary action; and is silent to the second groove width being greater than the first groove but smaller than the third groove.

However, XIA et al. discloses a polydimethylsiloxane (PDMS) mold having relief structures that form a network of empty channels to be filled with a liquid prepolymer by capillary action. This is a soft lithography method known as "micromolding in capillaries". The steps of this method is illustrated in Figure 1 below (XIA et al. p.562):

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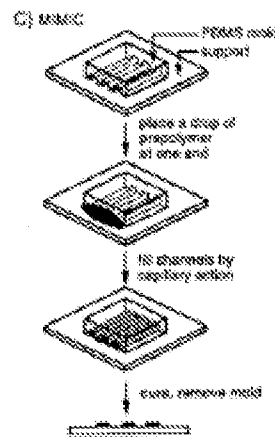


Figure 1

This method corresponds to instant claims 1, 5, 6, 10, 11, 14, and 16. In view of XIA et al.'s method of micromolding in capillaries, it would have been obvious to one of ordinary skill in the art to use the PDMS mold three times or use three PDMS molds in order to form three different sub-color filters with three different color resins, as required by NISHIKAWA et al.

The PDMS mold is an elastomer. The elasticity and low surface energy of the PDMS mold allows it to be detached easily from surfaces. It is also optically transparent down to about 300 nm in order to allow UV light to cure resin (XIA et al. pp.556, 562). This corresponds to instant claims 3, 4, 11, 12, 13, 17, 18, and 19. Also, the elastomeric mold offers the opportunity to manipulate the size and shape of features present on the mold so as to give different shapes to the injected resin or polymer in the mold such as a stripe shape. The cured polymers, therefore, possess almost the exact dimensions and shapes of the channels in the surface of the PDMS mold (XIA et al. p.567). This corresponds to instant claims 7 and 15.

XIA et al. teach the said elastomeric mold offers the opportunity to manipulate the size and shape of features present on the mold by mechanical deformation (pg.562). XIA et al. illustrates in figure below, that the width of the mold can be varied:

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Figure 18. AFM images of chromium structures on a master and a PU replica prepared from a PDMS mold cast from this master.<sup>1004</sup> The width is given in micrometers; the depth and height are given in nanometers.

It would have been obvious to one of ordinary skill in the art to have conducted routine experimentation to determine the optimum volume for each groove wherein second groove volume size is between the volume sizes of the first groove and the third groove based on the teachings of XIA et al. This corresponds to instant claims 1, 11, and 16.

NISHIKAWA et al. and XIA et al. are analogous art because they are from the same field of endeavor, that is microfabrication technology. At the time of the invention, one of ordinary skill in the art would have been motivated to modify the method of forming color filters for liquid crystal display devices of NISHIKAWA et al. to include the micromolding in capillaries method from XIA et al. because XIA et al. suggests that the use of soft lithography may be practical from display devices and that patterning techniques such as micromolding in capillaries have potential for application in emerging technologies or in high-resolution patterning (XIA et al. p.570). XIA et al.'s purpose for developing the use of soft lithography/micromolding in capillaries for the technology of microfabrication is to provide a convenient and inexpensive method to pattern small or large surfaces of substrates. The object of NISHIKAWA et al. invention is to provide a method for making a color filter for use in a liquid crystal display, which is simple and has a minimized manufacturing cost (Col.1, lines 5-7; Col.3, lines 6-15). XIA et al. suggests the method for liquid crystal displays and patterning, and NISHIKAWA et al. provides a display with a patterned layer. Therefore, the method of forming color filter layer for liquid crystal display device in instant claims 1-20 would have been obvious at the time the invention was made.

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Modified NISHIKAWA et al. by XIA et al. is silent to the first and second color filters being used as a sidewall for the next color filters. However, SONG et al. teach that liquid crystal display devices are made of red, green, and blue color filters that are arranged in a stripe shape as illustrated in Figure 5 (Page 3, [0040]). As seen in Figure 5, the first color filter (R) is used as a sidewall for the second color filter (G) and (G) is used as a sidewall for color filter (B).

Therefore, it would have been obvious to one of ordinary skill in the art to have substituted the stripe shaped color filter of SONG et al. for the color filter of NISHIKAWA et al. modified by XIA et al. in order to produce the stripe shape color filter for a liquid crystal display device. Also, it would have been a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular stripe shaped color filter was significant.

Modified NISHIKAWA et al. by XIA et al. is silent to the second and third mold used as the other sidewalls of the channels. However, NISHIKAWA et al. modified by XIA et al. teach the micromolding in capillaries for the technology of microfabrication to provide a convenient and inexpensive method to pattern small or large surfaces of substrates and that it would have been obvious to one of ordinary skill in the art to use the said PDMS mold three times or use three PDMS molds in order to form three different sub-color filters with three different color resins, as required by NISHIKAWA et al. to produce the said stripe shape of SONG et al. where the sidewalls of each color-filters are touching. In other words, it would have been obvious to one of ordinary skill in the art to use the PDMS mold of XIA et al. three times to produce the three different stripe color-filter of SONG et al. wherein the removable mold can be used as the other sidewall or the sidewall opposite of the said color-filter sidewall in order to produce the stripe shape color-filter of SONG et al. comprising three different color resins by the capillary action taught by XIA et al.

NISHIKAWA et al. and XIA et al. are analogous art because they are from the same field



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of endeavor, that is microfabrication technology. At the time of the invention, one of ordinary skill in the art would have been motivated to modify the method of forming color filters for liquid crystal display devices of NISHIKAWA et al. to include the micromolding in capillaries method from XIA et al. because XIA et al. suggests that the use of soft lithography may be practical from display devices and that patterning techniques such as micromolding in capillaries have potential for application in emerging technologies or in high-resolution patterning (XIA et al. p.570). XIA et al.'s purpose for developing the use of soft lithography/micromolding in capillaries for the technology of microfabrication is to provide a convenient and inexpensive method to pattern small or large surfaces of substrates. The object of NISHIKAWA et al. invention is to provide a method for making a color filter for use in a liquid crystal display, which is simple and has a minimized manufacturing cost (Col.1, lines 5-7; Col.3, lines 6-15). XIA et al. suggests the method for liquid crystal displays and patterning, and NISHIKAWA et al. provides a display with a patterned layer. Therefore, the method of forming color filter layer for liquid crystal display device in instant claims 1-20 would have been obvious at the time the invention was made.

NISHIKAWA et al. does not explicitly disclose the time it takes to fill the said channels. However, one having ordinary skill in the art would take the time required to inject the required amount of resin into the mold. In addition, there is no evidence on the record supporting a conclusion of new or unexpected results associated with the claimed filling time.

### ***Response to Arguments***

1. Applicant's arguments filed 09/16/2010 have been fully considered but they are not persuasive.

Applicant argues the amended claims 1, 11, and 16.

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Examiner respectfully disagrees with the Applicant's above arguments and would like to point out the reason(s) as discussed in the rejection:

NISHIKAWA et al. does not explicitly disclose the time it takes to fill the said channels. However, one having ordinary skill in the art would take the time required to inject the required amount of resin into the mold. In addition, there is no evidence on the record supporting a conclusion of new or unexpected results associated with the claimed filling time.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stella Yi whose telephone number is 571-270-5123. The examiner can normally be reached on Monday - Thursday from 8:00 AM to 5:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SY

/Jeff Wollschlager/  
Primary Examiner, Art Unit 1791